

# Examining the impact of carbon tariffs on trade

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# Background

- GHG emissions, unilateral climate policies and carbon leakage
- Carbon pricing v “cap and trade”
- Copenhagen Summit: Carbon tariffs
- Major carbon-intensive products
- Unilateral tariff increases “easier” to administer
- WTO compliance
- Push towards “global” climate policies

# Literature on trade and climate change is diverse and...

- *Pollution haven hypothesis [Copeland & Taylor (2004)]*
  - Significant evidence for trade flows & FDI [Keller & Levinson (2002, PE); List et. al. (2003, PE); Ederington et. al. (2005, PE); Babiker (2005, CGE); Levinson & Taylor (2008, PE); Dean et. al. (2009, PE)]
  - Limited/Insignificant evidence for trade flows & FDI [Felder & Rutherford (1993, CGE); Jaffe et. al. (1995, PE); Burniaux & Martins (2000, CGE); Frankel & Rose (2005, PE)]
- *Carbon leakage*
  - Substantive carbon leakage [Babiker (2005, CGE); Ho et. al. (2008, CGE); Grether & Mathys (2009); Aichele & Felbermayr (2010, PE)]
  - Low levels of leakage [OECD Green Model Studies (2000, CGE); World Bank (2008, PE)]

# ...inconclusive!

- *Policies to combat emissions and leakage*
  - Quirion & Demailly (2006, CGE) – Carbon-pricing in Annex 1 countries with BTA; effective in reducing leakage
  - Peterson & Schleich (2007, CGE) – BTA on non-Annex 1 countries; ineffective in mitigating leakage
  - Atkinson et.al. (2009, CGE) – border tax on virtual carbon leads to substantial effective tariffs on carbon-intensive exports
  - Fisher & Fox (2009, CGE) – unilateral emissions pricing with four alternative policies; none effective in mitigating leakage
  - Mattoo et.al. (2009, CGE) – BTA on carbon content of domestic production is the optimum policy option

# Motivation

- Wang & Watson (2007, PE) – Carbon-intensiveness of export production in China
- Aichele & Felbermayr (2010, PE): “Post-ratification net imports are larger than pre-ratification when only the importer is committed, while the reverse is true if only the exporter is committed.” (pp 15)

# Model specification

$$m_{ijkt} = \alpha_{ij} + \alpha_i \cdot \alpha_t + \alpha_j \cdot \alpha_t + \beta_1 va_{ikt} + \beta_2 va_{jkt} + \beta_3 dist_{ij} + \beta_4 LANG_{ij} + \beta_5 tar_{ijkt} + \beta_6 PTA_{ijt} + \beta_7 KP_{it} + \beta_8 KP_{jt} + \varepsilon_{ijt}$$

- Lower case variables are in log terms
- Upper case variables are dummy variables
- Economic data are in real value

# Data and sources

- *Trade and tariff*: WTO IDB (ISIC Rev. 3 and HS 96)
  - *Value added*: OECD STAN and UNIDO INDSTAT 4 (ISIC Rev. 3)
  - *Distance and language*: CIA Factfile
  - *Membership of PTAs*: Committee on RTAs, WTO
  - *Binding emissions cap & ratification of the Kyoto Protocol*: UNFCCC website
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- Eight KP Annex 1 importers
  - Twelve KP non-Annex 1 exporters
  - Six major carbon-intensive products
  - 1996-2008

# List of countries

- Importers: Canada, the EC, Iceland, Japan, New Zealand, Norway, Russian Federation and Switzerland (*Australia & Turkey EIF post-2008; USA not ratified – hence excluded*)
- Exporters: Argentina, Brazil, Chile, China, India, Indonesia, Israel, Mexico, the Philippines, South Africa, South Korea & Thailand (*Turkey and USA ?*)

NB: These countries account for 70-80% of global CO<sub>2</sub> emissions over 1996-2008



# List of products/sectors

- Paper and paper products
- Iron & steel
- Cement
- Basic chemicals
- Glass and glass products
- Aluminum

# Trade in these six products is significant for the importers...

Share (%) of C-intensive products in importers' (column) total imports from exporters (row) in 2005

Partner name	Australia	Canada	EU	Japan	CH	USA
World	8.3	10.0	7.2	7.9	11.1	7.5
Argentina	6.6	<b>37.3</b>	10.6	<b>13.4</b>	3.0	10.0
Brazil	<b>15.9</b>	<b>19.4</b>	<b>13.3</b>	9.0	11.9	<b>17.4</b>
Chile	<b>39.7</b>	9.5	<b>32.6</b>	<b>60.7</b>	<b>21.8</b>	10.1
China	6.0	4.3	3.5	5.2	11.6	3.0
India	11.8	12.8	10.8	9.8	<b>23.1</b>	8.2
Indonesia	7.1	8.7	11.8	10.3	7.9	3.0
Israel	17.4	6.8	10.0	8.7	5.9	2.9
Korea, Rep.	12.7	9.7	3.7	<b>17.4</b>	8.2	7.0
Mexico	2.4	3.0	10.2	<b>13.3</b>	<b>41.7</b>	4.0
Philippines	5.7	1.0	1.0	3.8	0.1	1.4
South Africa	<b>15.8</b>	<b>34.9</b>	<b>17.5</b>	<b>16.1</b>	1.6	<b>19.3</b>
Thailand	5.3	4.9	2.8	5.3	0.9	2.9
Turkey	4.0	<b>25.9</b>	5.7	6.8	1.2	12.9
United States	8.9	12.2	8.5	9.4	6.9	

# ...as well as for the exporting countries

Share (%) of C-intensive products in exporters' (row) total exports to importers (column) in 2005

Partner name	Australia	Canada	EU	Japan	Switzerland	USA
Argentina	7.1	<b>49.0</b>	<b>12.5</b>	<b>15.4</b>	1.6	10.6
Brazil	<b>18.7</b>	<b>25.9</b>	<b>14.8</b>	11.4	11.5	<b>19.4</b>
Chile	<b>43.5</b>	12.3	<b>35.8</b>	<b>68.6</b>	<b>16.3</b>	12.0
China	8.7	9.0	4.8	6.7	<b>16.1</b>	4.7
India	<b>12.9</b>	<b>19.1</b>	11.4	<b>12.8</b>	<b>24.8</b>	9.8
Indonesia	8.5	<b>14.8</b>	<b>15.4</b>	11.8	7.6	3.9
Israel	<b>20.2</b>	10.9	11.5	11.7	2.2	3.3
Korea, Rep.	<b>12.5</b>	<b>12.4</b>	3.6	<b>17.1</b>	8.5	7.5
Mexico	4.5	8.7	<b>12.6</b>	<b>22.8</b>	<b>39.2</b>	3.6
Philippines	6.6	3.0	1.1	4.0	0.3	1.8
South Africa	<b>12.9</b>	<b>57.0</b>	<b>21.2</b>	<b>17.4</b>	1.1	<b>23.3</b>
Thailand	6.1	7.8	3.1	5.3	0.8	3.6
Turkey	4.5	<b>37.9</b>	6.5	8.4	1.1	<b>14.9</b>
United States	10.6	12.0	10.1	12.1	5.6	

# And the tariffs are generally low

Average weighted tariffs (%) on exporters' (row) C-intensive products in destination markets (column) in 2005

Partner name	Australia	Canada	EU	Japan	USA
World	3.2	1.4	2.1	0.8	1.4
Argentina	2.6	0.4	1.1	1.4	1.8
Brazil	2.9	1.3	1.8	1.2	2.0
Chile	1.4	1.0	2.5	0.9	1.7
China	3.3	1.4	2.5	0.7	1.9
India	2.9	1.7	2.2	1.6	2.4
Indonesia	3.4	1.1	1.9	1.2	2.4
Israel	4.0	1.8	1.6	0.9	3.6
Korea, Rep.	4.6	1.8	1.8	0.6	1.5
Mexico	4.3	1.5	1.9	1.7	1.3
Philippines	3.1	1.8	2.9	0.5	2.5
South Africa	3.0	1.2	1.7	1.3	1.3
Thailand	4.4	1.5	1.7	0.9	2.0
Turkey	3.2	0.9	2.1	0.8	2.9
United States	3.3	1.4	1.7	0.4	

# Finally

- It'll be interesting to see the actual results from the tariff simulations
- Also interesting to find out if this idea itself will sell
- Comments and suggestions welcome
- Thank you!